tric forces, which is cited as a proof of Maxwell's theory of stress in the medium, is rather an obstacle than a support to the theory, as some dielectrics are strained in one way, and others in the opposite, while, on Maxwell's theory, the strain should all be of one kind. The statement on p. 97, that the sparking distance increases very much more rapidly than the increase in the difference of potential between the electrodes, should have been limited to the case where the electrodes are pointed ; it is not true when the dimensions of the electrodes are large compared with the sparking distance. The proof of the expression for the electromotive force due to induction, on p. 170, does not seem to us to be sound ; and the method of measuring the coefficient of self-induction of a coil was really invented by Maxwell, and given by him in his paper on the "Dynamics of the Electric Field," though it is not in the "Electricity and Magnetism."

We must, in conclusion, congratulate the author on having written one of the best treatises on elementary physics which it has ever been our good fortune to read.

J. J. T.

THE ART OF PAPER-MAKING.

The Art of Paper-Making. By Alexander Watt. (London : Crosby Lockwood and Son, 1890.)

THE author of this work, in the preface, expresses his thanks to certain gentlemen who have been good enough to conduct him through their mills and explain to him the various operations performed therein. From this we gather that the author is not only not a practical paper-maker, but that, up to the time of writing the book, he had but a limited and general knowledge of the subject. These conclusions are amply justified by a perusal of the book. This want of practical knowledge can hardly be wondered at, as the writer is already an authority on such widely different subjects as soap-making, leather manufacture, electro-metallurgy, electro-deposition, &c.

On the other hand, there is evidence that on the whole the author has devoted some considerable time to the reading up of his subject, though in many cases he has not consulted the latest authorities. For example, in speaking of the properties of cellulose, he quotes the opinions expressed by Mr. Arnot in his Cantor Lectures for 1877, since which time several additions have been made to our knowledge. We should have preferred to see more space devoted to this branch of the subject, as on the proper understanding of the properties of cellulose the scientific manufacture of paper depends.

Some of the statements with regard to cellulose are inaccurate and misleading, as for example, that "hydrochloric acid converts it into a fine powder without altering its composition," and again, that "nitric acid forms substitution products of various degrees, according to the strength of acid employed." As a matter of fact, ordinary nitric acid does not form nitro-substitution products with cellulose.

Under the head of the "Recognition of Vegetable Fibres by the Microscope," esparto—perhaps the most important raw material used in this country—is not even mentioned. The author's descriptions of the various mechanical appliances used in paper-making are, with one or two exceptions, accurate and fairly complete. In describing the chemical processes involved, however, the author occasionally gets out of his depth. For instance, he recommends certain qualities of rags to be boiled with 30 per cent. of caustic soda. At first we thought this was a misprint for 3 per cent., but on referring to the source of the information, we found that the author had quoted correctly. Again, we are told that the neutralization of chlorine in pulp by hyposulphite, which the author says is sometimes called thiosulph*i*te, is effected when the liquor ceases to redden litmus paper.

In giving directions for the sizing of paper, the author appears to have left out a number of decimal points. According to him 100 parts of pulp require 10–12 parts of rosin, and 20–30 parts of starch, and from 30–50 parts of kaolin. In the interest of the consumer it is satisfactory to know that such numbers are impossible.

In the chapter containing directions for the testing of alkalies, alum, &c., the following extraordinary statement occurs : "There are two principal methods of analyzing or assaying alkalies by means of the test acid—namely, volumetric, or by volume, and gravimetric, or by weight, in which a specific gravity bottle, capable of holding exactly 1000 grains of distilled water, is used."

Another instance of looseness of style occurs in the statement that "the proportion of caustic soda per cwt. of rags varies to the extent of from 5 to 10 per cent. of the former to each cwt. of the latter."

The general plan of the book also shows want of careful preparation ; for example under the head of "Action of Acids on Cellulose," the author discusses the action of the strongly alkaline solution of cuprammonium.

In speaking of the origin of the wood-pulp process, the author champions the right of his father to be regarded as the pioneer. Similarly, with regard to electrolytic bleaching, we are told that the modern Hermite process, which has been successfully applied to the bleaching of paper pulp, is the outcome of an invention patented by his brother in 1851. It is perfectly true that in this patent the electrolysis of chlorides was claimed, but this in no way diminishes the credit due to those who have based on this principle a practical and successful manufacturing process.

OUR BOOK SHELF.

A Contribution to the Natural History of Scarlatina, derived from Observations on the London Epidemic of 1887–88. By D. Astley Gresswell, M.A., M.D. Oxon. (Oxford : Clarendon Press, 1890.)

THIS volume constitutes Dr. Gresswell's dissertation for the degree of Doctor of Medicine at Oxford, and is published "as a mark of distinction" by the University. It is the result of some six months clinical work at the South-Western Fever Hospital of the Metropolitan Asylums Board, and the author is to be congratulated alike upon the large number of carefully recorded observations which he has made, and upon the evidence his book affords of his careful study of the literature of scarlatina.

Between September 1887 and February 1888 Dr. Gresswell had charge of nearly 600 fever patients, and the statistical tables with which his treatise abounds are thus based on no inconsiderable number of cases. After some

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general considerations with respect to the disease, certain special symptoms are passed in review, particular attention being devoted to their relation to season. Then follows an exhaustive discussion of scarlatinal albuminuria. Perhaps the most striking fact brought out in the book is the contrast presented in regard to this symptom between the patients admitted during October and November, and those admitted during December and January. While albumen was discovered previous to "getting up for the first time" in only rather more than 50 per cent. of the latter group of cases, it was found in every such case investigated in the two earlier months. This universal occurrence of albuminuria in the first three weeks of the disease, during the height of the epidemic, is eminently noteworthy; as Dr. Gresswell says, it could not have been "a mere casual incident of pyrexial origin," nor could he account for it by differences of sex, age, stage of illness on admission, or treatment. All observers of the scarlatina of the latter half of 1887 seem to have been impressed with the unusually frequent occurrence of albumen in the urine. Dr. Sweeting referred it to overcrowding; Dr. Gresswell inclines to consider it as accounted for by the change in the character of the disease during the progress of the epidemic.

Although the chapter on "postural albuminuria" is of considerable interest, much of its subject-matter is not immediately connected with the natural history of scarlatina, while an important question like secondary sore throat is very briefly dealt with. Two cases of "reversio eruptionis" are quoted, but in one, as Dr. Gresswell admits, there is but scant evidence that the child had scarlatina on admission.

Attention is particularly devoted throughout to the variations in the phenomena of the disease in their relation to season, and the concluding section of the work contains some interesting suggestions with regard to this topic. The author upholds the view that variations in the life-history of the micro-organism of scarlatina lie at the root of the matter, but surely he goes rather far afield when he alludes to the possibility of the "interfertilization of different kinds of microbes."

The hope may be entertained that Dr. Gresswell will not lack imitators in selecting this particular branch of study as the subject of dissertation for the M.D. degree. There is abundant scope for research at the Asylums Board hospitals, and if the work be as full of interest as it is in the example before us, it cannot fail to redound to the credit of the worker.

Le Soleil; les Etoiles. By Gabriel Dallet. (Paris: Firmin-Didot et Cie., 1890.)

THE chapters on the constellations, in this work, are of a very comprehensive character. That devoted to a description of instruments of observation contains a fair amount of useful information, whilst tables of parallaxes and proper motions, double and variable stars, and other interesting objects visible in our hemisphere, compiled from the British Association Catalogue, *Connaissance des Temps*, and *L'Annuaire du Bureau des Longitudes*, are plentifully and properly distributed throughout, and render the work what it purports to be, an "Astronomie Pratique." The author is, however, evidently not at home when writing on spectroscopy, and is considerably behind the recent developments in that branch of astronomy. As an example of this deficiency we would cite his assertion that the spectrum of the Orion nebula consists of three bright lines, as discovered by Dr. Huggins in 1864, although recent observations have increased the number visible to nine, and the photographic spectrum shows many times this amount.

The author seems also to have very vague ideas as to the origin of the universe. He says:—"Notre soleil et ses planètes ont dû se trouver au centre d'une nébuleuse, mais la matière cosmique qui la formait comprenait une variété considérable d'éléments chimiques qui ne se présentent pas dans nébuleuses proprement dites"; a conclusion which leads him to write:—"Nous pouvons dire avec M. Huggins que les nébuleuses à spectre gazeux sont des systèmes ayant une structure et une organisation à part, et qui sont d'un ordre différent de celui dont notre soleil, avec ses planètes, faisait partie dans la nébuleuse primitive"; although in justice to Dr. Huggins it should be said that he has now rejected the conviction that "the nebulæ which give a gaseous spectrum are systems possessing a structure, and a purpose in relation to the universe, altogether distinct and of another order from the great group of cosmical bodies to which our sun and the fixed stars belong."

Little spectroscopy other than this is included in the work, observations of sun-spots and prominences being mainly considered from a pictorial point of view. There is no doubt, however, that the twelve maps of the heavens will be of service to amateur astronomers, and that the ninety-three illustrations are in general well chosen. We should be glad, therefore, to see the slight inaccuracies that we have indicated eliminated in a future edition.

Father Perry, F.R.S. By Aloysius L. Cortie, S.J. (London: The Catholic Truth Society, 1890.)

THE author of this little book was a friend of the late Father Perry, and is, therefore, most capable of writing a sketch of his life and work, and few lives could afford more of the material which makes such a sketch interesting.

The programme of work undertaken by the deceased astronomer ten years ago at Stonyhurst College Observatory was comprehensive. It included the daily drawing of the sun when possible, the measurement of the depth of the chromosphere, the heights of prominences, and observations of sun-spot spectra, and this programme was faithfully adhered to up to the time of his death. The method of obtaining the drawings of sun-spots which have appeared in the Memoirs of the Royal Astronomical Society is described, and the reproduction of two of the largest spots shows how much can be effected by means of the pencil. These drawings are of great importance, and supplement solar photographs. The main object in making them was to throw light upon the theories of the mode of formation of spots, and to find, if possible, the clue to the connection between terrestrial magnetism and solar activity. This discussion however, was cut short by death.

A copy of the photograph of the solar corona, from the observation of which Father Perry was carried to his death-bed, testifies more than volumes of words to the character of the man whose life is before us, and the long list of published papers and the expeditions in which he took part speak of his industry. A few of his notes on faculae and veiled spots are appended, and render this volume of 112 pages something more than a biography.

Prodomus Faunæ Mediterraneæ sive Descriptio Animalium maris Mediterranei incolarum quam comparata silva rerum quatenus innotuit adjectis locis et nominibus vulgaribus eorumque auctoribus in commodum Zoologorum congessit Julius Victor Carus. Vol. I. Pars II., Vol. II., Pars I. (Stuttgart: E. Schweizerbart'sche Verlagshandlung.)

SOME five years ago we welcomed the appearance of the first part of Prof. J. Victor Carus's "Prodomus Faunæ Mediterraneæ" (NATURE, vol. xxxi. p. 201); since then, two additional parts have been published. The second completes vol. i., and contains the Arthropods; it was published early in 1885. The third part, the first of vol. ii., was published late in last year, and contains the Brachiostomata and Mollusca.

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